



IFW

Docket No.: 0171-1294PUS1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Masayuki MORITA et al.

Application No.: 10/588,232

Confirmation No.: N/A

Filed: August 3, 2006

Art Unit: N/A

For: ELECTRODE FOR ENERGY STORAGE DEVICE
AND PROCESS FOR PRODUCING THE SAME

Examiner: Not Yet Assigned

**LETTER SUBMITTING THE INTERNATIONAL REPORT ON PATENTABILITY AND
REFERENCE CITED ON INTERNATIONAL SEARCH REPORT**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Subsequent to the filing of the above-identified application on August 3, 2006, **attached hereto** is an English translation of 1) International Preliminary Report on Patentability (Form PCT/IB/338 and 373) and 2) the Written Opinion of the International Searching Authority (Form PCT/ISA/237) that should be made of record in the present application. The PTO is requested to make these documents of record in the file of the present application and to return the initialed Form PTO-SB08 to the undersigned. Furthermore, **Applicants enclose herewith** a copy of the English abstract of MUKAI (Dai 44 Kai Battery Symposium in Japan, November 4, 2003, pages 672-673) which was cited on the International Search Report. Applicants note from a review of PAIR that the International Bureau failed to forward a copy of MUKAI to the PTO as is required when a PCT application enters the national phase under 371.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or to credit any overpayment to Deposit Account No. 02-2448 for any


Application No.: 10/588,232

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additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Dated: November 3, 2006

Respectfully submitted,

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Attachments: 1) English translation of International Preliminary Report on Patentability (Form PCT/IB/338 and 373)
2) English translation of the Written Opinion of the International Searching Authority (Form PCT/ISA/237)
3) English abstract of MUKAI (Dai 44 Kai Battery Symposium in Japan, November 4, 2003, pages 672-673)

PATENT COOPERATION TREATY

PCT/JP2005/001388

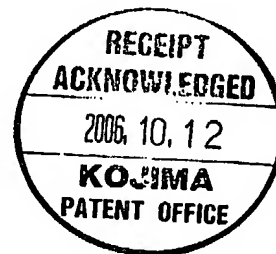
From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF TRANSMITTAL
OF COPIES OF TRANSLATION
OF THE INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY
(CHAPTER I OR CHAPTER II
OF THE PATENT COOPERATION TREATY)
(PCT Rules 44bis.3(c) and 72.2)

To:

KOJIMA, Takashi
Ginza Ohtsuka Bldg. 2F.
16-12, Ginza 2-chome
Chuo-ku, Tokyo 1040061
JAPON



Date of mailing (day/month/year) 28 September 2006 (28.09.2006)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference FAP-4069	
International application No. PCT/JP2005/001388	International filing date (day/month/year) 01 February 2005 (01.02.2005)
Applicant YAMAGUCHI UNIVERSITY et al	

1. Transmittal of the translation to the applicant.



The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter I).



The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter II).

2. Transmittal of the copy of the translation to the designated or elected Offices.

The International Bureau notifies the applicant that copies of that translation have been transmitted to the following designated or elected Offices requiring such translation:

None

The following designated or elected Offices, having waived the requirement for such a transmittal at this time, will receive copies of that translation from the International Bureau only upon their request:

AE, AG, AL, AM, AP, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EA, EC, EE, EG, EP, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OA, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

3. Reminder regarding translation into (one of) the official language(s) of the elected Office(s).

The applicant is reminded that, where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability (Chapter II).

It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned within the applicable time limit (Rule 74.1). See Volume II of the PCT Applicant's Guide for further details.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Masashi Honda
Facsimile No. +41 22 338 82 70	Facsimile No. +41 22 338 82 70

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference FAP-4069	FOR FURTHER ACTION	See item 4 below
International application No. PCT/JP2005/001388	International filing date (<i>day/month/year</i>) 01 February 2005 (01.02.2005)	Priority date (<i>day/month/year</i>) 06 February 2004 (06.02.2004)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant YAMAGUCHI UNIVERSITY		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> | Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Date of issuance of this report 19 September 2006 (19.09.2006)
Facsimile No. +41 22 338 82 70	Authorized officer <div style="text-align: center; font-weight: bold; font-size: 1.2em;">Masashi Honda</div> e-mail: pt08@wipo.int

PATENT COOPERATION TREATY

TRANSLATION

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing
(day/month/year)

Applicant's or agent's file reference
FAP-4069

FOR FURTHER ACTION

See paragraph 2 below

International application No.
PCT/JP2005/001388

International filing date (day/month/year)
01.02.2005

Priority date (day/month/year)
06.02.2004

International Patent Classification (IPC) or both national classification and IPC

Applicant
YAMAGUCHI UNIVERSITY

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/JP

Authorized officer

Facsimile No.

Telephone No.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2005/001388

Box No. 1

Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language
_____, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2005/001388

Box No. V	Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	<u>1-29</u>	YES
	Claims	_____	NO
Inventive step (IS)	Claims	<u>1-29</u>	YES
	Claims	_____	NO
Industrial applicability (IA)	Claims	<u>1-29</u>	YES
	Claims	_____	NO
2. Citations and explanations:			
<p>Claims 1-29</p> <p>The inventions of claims 1-29 are neither described in any of the documents cited in the ISR nor obvious to a party skilled in the art.</p>			

アミノキノキサリン類の電解重合と そのキャパシタ電極特性

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近岡克己*、笠井幹生*、大土井啓祐*

Electro-Polymerization of Aminoquinoxalines and Their Characteristics as Electrochemical Capacitors

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The electrochemical polymerization of aminoquinoxalines(AQX) and the electrochemical properties of resulting polymers have been investigated. The polymerization was performed in *N,N*-dimethylformamide (DMF) containing AQX under acidic conditions. The polymerization behavior depended on the chemical structure of AQX. The polymerized AQX with biphenyl substituent showed high redox activity not only in aqueous acid but also in non-aqueous acetonitrile solutions. The redox activity of the polymer was examined as the electrode material for electrochemical capacitors.

1. 緒言

π 共役系化合物の中には電気的、光学的及び電気化学的に興味深い性質を持つものが多く、材料科学の分野でさまざまな提案がなされている。アミノキノキサリン類(Fig. 1)は、分子内に電子供与部位と電子吸引部位が隣接して存在するために電子的に特異な挙動を示す。本研究では、この化合物の有機材料化を、電解酸化による重合を用いて行い、さらに得られた重合物の電気化学的挙動並びに電気化学キャパシタ特性について調査した。

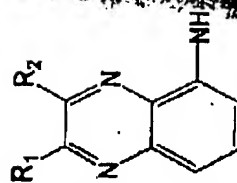


Fig. 1 Aminoquinoxaline

2. 実験方法

アミノキノキサリン(AQX)類の電解重合は、試験極基板上に白金(Pt)板を使用し、極に Pt メッシュ、参照極に Ag/Ag⁺ を隔えた三極式セルを用いて、定電位法または定電流法を用いて行った。HCl または HClO₄ を少量添加した DMF 溶液に AQX を溶かしたものを電解液に使用した。生成した膜のキャパシタリゼーションは、MASS-10 XRD を用いた。重合物の電気化学的レドックス挙動の測定と充放電試験は、0.1 M dm⁻³(M)の過塩素酸テトラエチルアンモニウム(TEAP)を溶解したアセトニトリルおよび 0.1 M H₂SO₄ 水溶液中で行った。

3. 結果及び考察

電気化学的重合の反応性は置換基 R₁, R₂ の種類により異なった。その中でも、R₁=R₂=C₆H₅ を有する AQX は酸性 DMF 電解液中、約 0.9 V vs. Ag/Ag⁺ 以上の電位で酸化重合し、電極上に黒色の膜を形成した。HClO₄/DMF 電解液から Pt 電極上に調製した重合膜は、非水系(AN)電解液中、水系(0.1 M H₂SO₄)電解液中でレドックス応答が確認された。しかしながら、ITO 上に生成した薄膜は水系(H₂SO₄)電解液中では、測定中に膜が電極基板から剥離しやすかった。

Fig. 2 に R₁=R₂=C₆H₅ の AQX から重合した膜の 0.1 M H₂SO₄ 水溶液中でのサイクリックボルタモグラムの示す。-0.1 V と +0.6 V 付近にレドックス応答が確認される。このレドックス応答はサイクルを繰り返すと次第に大きくなった。一方、1.0 V 以上の酸化電流はサイクルを繰り返すにつれて小さくなった。これは、膜の調製の際に用いた DMF が膜中に残存していたことと関係すると思われる。

Fig. 3 には R₁=R₂=C₆H₅ の AQX から重合した膜の 0.1 M TEAP を含む AN 溶液中でのサイクリックボルタモグラムを示す。固体として水溶液中でのレドックス応答よりも少し小さいが、+0.7~1.1 V および +0.2~-0.3 V にそれぞれプロードな酸化・還元電流の応答が確認される。いずれの応答もサイクルを繰り返すと次第に小さくなる傾向にあった。これらの重合膜を用いて充放電試験を行い、電気化スーパーキャパシタ特性についても検討を行った。

AQX 類の重合度などの場合においても低かったため、重合度の向上を目的にアニリンと共重合を行い、AQX だけで重合を行った場合と同様の検討を行った。その結果、共重合比によっては、共重合膜の方に大きな R₁, R₂ を有する AQX についても電解重合とそのレドックス応答を検討した。

これらの場合も重合度はあまり高くないことがわかった。アニリンとの共重合を行い、重合度の高い膜を得る試みを行った。得られた膜のレドックス応答を利用し、スーパーキャパシタ特性については当日報告する。

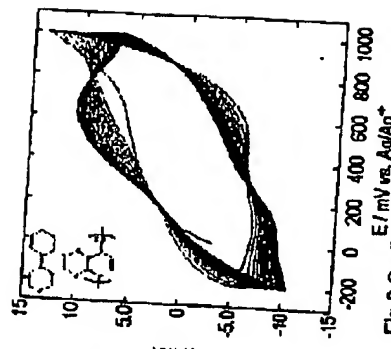


Fig. 2 Cyclic voltammogram for poly(aminoquinoline) on Pt plate in 0.1 M H₂SO₄ aqueous solution.

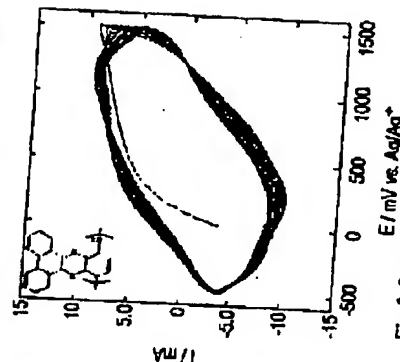


Fig. 3 Cyclic voltammogram for poly(aminoquinoline) on Pt plate in AN containing 0.1 M TEAP.

第44回電池討論会

講演要旨集

日時 平成15年11月4日(火)・5日(水)・6日(木)

会場 リーガロイヤルホテル堺

(〒590-0985 堺市戎島町4-45-1)

《討論主題》

1. 電池の反応機構
2. 新しい電池材料
3. 高出力電池
4. 燃料電池の新展開

《国際セッション》

International Session on Fuel Cells,
Batteries and Capacitors for Vehicles

主催 (社)電気化学会 電池技術委員会

協賛

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第44回電池討論会 講演要旨集

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